

**BEFORE  
THE PUBLIC SERVICE COMMISSION OF  
SOUTH CAROLINA**

**DOCKET NO. 2018-319-E**

In the Matter of:	)	
	)	<b>DIRECT TESTIMONY OF</b>
Application of Duke Energy Carolinas, LLC	)	<b>JOSEPH A. MILLER JR.</b>
for Adjustments in Electric Rate Schedules	)	<b>FOR DUKE ENERGY</b>
and Tariffs	)	<b>CAROLINAS, LLC</b>

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**I. INTRODUCTION AND OVERVIEW**

**Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.**

A. My name is Joseph A. Miller Jr. and my business address is 526 South Church Street, Charlotte, North Carolina.

**Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?**

A. I am Vice President of Central Services for Duke Energy Business Services, LLC, which is a service company subsidiary of Duke Energy Corporation (“Duke Energy”) that provides services to Duke Energy and its subsidiaries, including Duke Energy Carolinas, LLC (“DE Carolinas” or the “Company”) and Duke Energy Progress, LLC (“DE Progress”).

**Q. PLEASE BRIEFLY DESCRIBE YOUR EDUCATIONAL AND PROFESSIONAL BACKGROUND.**

A. I graduated from Purdue University with a Bachelor of Science degree in mechanical engineering. I also completed twelve post graduate level courses in Business Administration at Indiana State University. My career began with Duke Energy (d/b/a Public Service of Indiana) in 1991 as a staff engineer at Duke Energy Indiana’s Cayuga Station. Since that time, I have held various roles of increasing responsibility in the generation engineering, maintenance, and operations areas, including the role of station manager, first at Duke Energy Kentucky’s East Bend Station, followed by Duke Energy Ohio’s Zimmer Station. I was named General Manager of Analytical and Investments Engineering in 2010, and became General Manager of Strategic

1           Engineering in 2012 following the merger between Duke Energy and Progress  
2           Energy, Inc. I became the Vice President of Central Services in 2014.

3   **Q.   WHAT ARE YOUR DUTIES AS VICE PRESIDENT OF CENTRAL**  
4   **SERVICES?**

5   A.   In this role, I am responsible for providing engineering, environmental  
6       compliance planning, generation and regulatory strategy, technical  
7       servicesand maintenance services, for Duke Energy's fleet of fossil,  
8       hydroelectric, and solar (collectively, "Fossil/Hydro/Solar") facilities.

9   **Q.   HAVE YOU TESTIFIED BEFORE THIS COMMISSION IN ANY**  
10   **PRIOR PROCEEDINGS?**

11   A.   Yes. I submitted testimony in the Company's 2013 rate case proceeding in  
12       Docket No. 2013-59-E (the "2013 Rate Case") and testified before this  
13       Commission in DE Progress' 2016 rate case proceeding in Docket No. 2016-  
14       227-E . In addition, I testify in DE Progress' and DE Carolinas' South  
15       Carolina annual fuel proceedings. I have also testified on multiple occasions  
16       on behalf of Duke Energy in proceedings before this and other state  
17       commissions.

18   **Q.   WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS**  
19   **PROCEEDING?**

20   A.   The purpose of my testimony is to support DE Carolinas' request for a base  
21       rate adjustment. My testimony will describe the Company's  
22       Fossil/Hydro/Solar generation assets and update the Commission on capital  
23       additions. Since its last rate case, DE Carolinas has built additional generating

1 facilities to service customers. Specifically, the Company completed the new  
2 W.S. Lee Combined Cycle (“CC”) plant in April 2018, which provides 753  
3 MWs of capacity, of which 653 MWs is owned by DEC, an investment of  
4 approximately \$639 million. This new plant emits carbon dioxide at half the  
5 rate, and nitrogen and sulfur oxide emissions at a fraction of the rate compared  
6 to existing and retired coal plants. Additionally, DE Carolinas completed the  
7 Catawba-Wateree relicensing effort for the 13 hydro stations, an investment of  
8 approximately \$126 million. The new license will allow these stations to  
9 operate until 2055. Further, to advance towards a more sustainable energy  
10 future, DE Carolinas constructed two large solar projects (Mocksville and  
11 Monroe) in 2016 and 2017. These projects have been completed and add a  
12 total of 75 MWs of nameplate capacity, providing 35 MWs of relative  
13 dependable summer capacity, an investment of approximately \$152 million.

14 Finally, I provide operational performance results for the period  
15 January 1, 2017 through December 31, 2017 (the “Test Period”); explain the  
16 key drivers impacting operations and maintenance (“O&M”) expenses; and  
17 provide an overview of capital planned for the next few years for  
18 Fossil/Hydro/Solar generation asset investments.

19 **Q. HOW IS THE REMAINDER OF YOUR TESTIMONY ORGANIZED?**

20 **A.** The remainder of my testimony is organized as follows:

21 II. FOSSIL/HYDRO/SOLAR FLEET

22 III. CAPITAL ADDITIONS

23 IV. O&M AND OTHER ADJUSTMENTS

V. PERFORMANCE

VI. CAPITAL BUDGET AND COST DRIVERS

VII. CONCLUSION

## II. FOSSIL/HYDRO/SOLAR FLEET

**Q. PLEASE DESCRIBE DE CAROLINAS' FOSSIL/HYDRO/SOLAR GENERATION FLEET.**

**A.** The Company's Fossil/Hydro/Solar generation portfolio consists of approximately 14,966 megawatts ("MWs") of generating capacity, made up as follows:

Coal-fired -	6,764 MWs
Steam Natural Gas -	170 MWs
Hydro -	3,245 MWs
Combustion Turbines -	2,665 MWs
Combined Cycle -	2,083 MWs
Solar -	39 MWs

The coal-fired assets consist of four generating stations and a total of 13 units. These units are equipped with emissions control equipment, including selective catalytic or selective non-catalytic reduction ("SCR" or "SNCR") equipment for removing nitrogen oxides ("NO<sub>x</sub>") and flue gas desulfurization ("FGD" or "scrubber") equipment for removing sulfur dioxide ("SO<sub>2</sub>"). In addition, all 13 coal-fired units are equipped with low NO<sub>x</sub> burners. The steam natural gas unit – W.S. Lee Station Unit 3 – is considered to be a peaking unit.

The Company has a total of 31 simple cycle combustion turbine ("CT")

1 units, of which 29 are considered the larger group providing approximately  
2 2,581 MWs of capacity. These 29 units are located at Lincoln, Mill Creek and  
3 Rockingham Stations, and are equipped with water injection systems that reduce  
4 NO<sub>x</sub> and/or have low NO<sub>x</sub> burner equipment in use. The W.S. Lee CT facility  
5 includes two units with a total capacity of 84 MWs equipped with black start  
6 ability in support of DEC's Oconee Nuclear Station. The 2,083 MWs, shown  
7 earlier as "combined cycle" ("CC"), represent the Buck CC, Dan River CC and  
8 W.S. Lee CC facilities. These facilities are equipped with technology for  
9 emissions control including selective catalytic reductions (SCRs), low NO<sub>x</sub>  
10 combustors, and carbon monoxide/volatile organic compounds catalysts. The  
11 Company's hydro fleet includes two pumped storage facilities with four units  
12 each that provide a total capacity of 2,140 MWs, along with conventional hydro  
13 assets consisting of 74 units providing approximately 1,105 MWs of capacity.  
14 The 39 MWs of solar capacity are made up of 18 roof top solar sites providing 4  
15 MWs of relative summer dependable capacity, the Mocksville solar site  
16 providing 7 MWs of relative summer dependable capacity and the Monroe solar  
17 site providing 28 MWs of relative summer dependable capacity.

18 **Q. WHAT CAPACITY CHANGES HAVE OCCURRED WITHIN THE**  
19 **FLEET SINCE THE 2013 RATE CASE?**

20 A. As mentioned previously, the Company's recent major new generation  
21 additions include the W.S. Lee CC plant, which provides 653 MWs of DE  
22 Carolinas' capacity, and the addition of two solar facilities adding a total of 75  
23 MWs of nameplate capacity, providing 35 MWs of dependable capacity. DE

1 Carolinas has also retired older coal plants at Riverbend, Buck and W.S. Lee  
2 for a reduction of 910 MWs. W.S. Lee Unit 3 coal was converted to natural  
3 gas in May 2015, maintaining 170 MWs.

4 **Q. WERE UPDATES MADE TO THE PROBABLE RETIREMENT**  
5 **DATES OF FOSSIL HYDRO PLANTS INCLUDED IN THE RECENT**  
6 **DEPRECIATION STUDY?**

7 A. Yes, there were updates made to the probable retirement dates for several  
8 fossil plants to better align with the industry information for supercritical and  
9 subcritical coal units and assumptions for future environmental regulations.  
10 Specifically, the probable retirement date for Allen Station was updated to  
11 2026; the probable retirement date Cliffside Unit 5 was updated to 2032; the  
12 probable retirement date for Belews Creek Station was updated to 2037; and  
13 the probable retirement for Marshall Station was updated to 2034.<sup>1</sup>

14 The following hydro stations retirement dates were changed to 2055 to  
15 align with expiration of their FERC operating license: Bridgewater, Cedar  
16 Creek, Cowan's Ford, Dearborn, Fishing Creek, Great Falls, Lookout Shoals,  
17 Mountain Island, Oxford, Rhodhiss, Rocky Creek, Wateree, and Wylie.

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<sup>1</sup> As explained in Witness Doss's testimony at pages 9-10, the probable retirement dates used in the Depreciation Study represent the date of the last projected retirement for each plant/depreciable group.

1 **III. CAPITAL ADDITIONS**

2 **Q. PLEASE DESCRIBE THE MAJOR FOSSIL/HYDRO/SOLAR**  
3 **CAPITAL PROJECTS COMPLETED SINCE THE COMPANY'S LAST**  
4 **RATE CASE PROCEEDING.**

5 A. The major Fossil/Hydro/Solar capital projects in service and included in this  
6 request total approximately \$917 million. The addition of the W.S. Lee CC,  
7 totaling approximately \$639 million, further increases the Company's use of  
8 natural gas at a time when pricing has been at favorable lows, and features  
9 state-of-art technology for increased efficiency and significantly reduced  
10 emissions. DE Carolinas also added the Mocksville and Monroe solar sites in  
11 late 2016 and early 2017, with a total of 75 MWs of nameplate capacity  
12 providing 35 MWs of relative dependable summer capacity. The Mocksville  
13 solar site totaling \$34 million and the Monroe site at \$118 million provides  
14 DE Carolinas customers with carbon free generation. The Company has 13  
15 hydro stations on the Catawba and Wateree river basins, and has completed  
16 the relicensing effort for the hydro stations on the Catawba-Wateree, totaling  
17 \$126 million. The 40 year license (FERC #2232) was granted in November  
18 2015 and allows our stations to operate until 2055.

19 **Q. DID THE COMPANY RECEIVE REGULATORY APPROVAL FOR**  
20 **THE CONSTRUCTION OF THE NEW COMPLETED GENERATION**  
21 **FACILITIES INCLUDED IN THIS CASE?**

22 A. Yes. The Mocksville and Monroe solar facilities were granted certificates of  
23 public convenience and necessity ("CPCNs") by the North Carolina Utilities



1 Commission in Docket Nos. E-7 Sub 1098 and Sub 1079, respectively. The  
2 W.S. Lee CC was granted a Certificate of Environmental Compatibility and  
3 Public Convenience and Necessity (“CECPCN”) by the Public Service  
4 Commission of South Carolina in Docket No. 2013-392-E.

5 **Q. MR. MILLER, ARE THESE CAPITAL ADDITIONS USED AND**  
6 **USEFUL IN PROVIDING ELECTRIC SERVICE TO DE CAROLINAS’**  
7 **ELECTRIC CUSTOMERS IN SOUTH CAROLINA?**

8 A. Yes. The Company’s new solar facilities and W.S. Lee CC described above  
9 are commercially operational. The solar facilities provide clean, carbon free  
10 generation to benefit customers, and the new CC plant provides state-of-the-  
11 art technology for efficiency and flexibility of operation, along with the best  
12 available technology for environmental controls. Likewise, the Company’s  
13 investments in maintenance capital and compliance efforts position the  
14 Company for the continued safe, reliable and efficient operation of these  
15 assets, with high quality operational performance.

16 **Q. IN YOUR OPINION, HAVE THE COSTS RELATED TO THE**  
17 **COMPANY’S CAPITAL ADDITIONS BEEN PRUDENTLY**  
18 **INCURRED?**

19 A. Yes. The Company controls costs for capital projects and O&M using a cost  
20 management program. The Company also controls costs through routine  
21 executive oversight of project budget and activity reporting with new projects  
22 requiring approval by progressively higher levels of management depending  
23 on total project cost. Further, the Company controls ongoing project and

O&M costs through strategic planning and procurement; efficient oversight of contractors by a trained and experienced workforce; rigorous monitoring of work quality; thorough critiques to drive out process improvement; and industry benchmarking to ensure best practices are being used.

**Q. HOW DO CUSTOMERS BENEFIT FROM THE COMPANY'S MANAGEMENT EFFORTS FOR THE FOSSIL/HYDRO/SOLAR FLEET?**

A. Our customers benefit from DE Carolinas' modernization efforts in multiple ways. Initially, as demonstrated by the Company's resource planning analyses, the Company's fleet modernization efforts have enabled it to continue to provide safe, efficient and reliable service to DE Carolinas' customers at least reasonable cost. These efforts have also reduced the Company's environmental footprint by adding state-of-the-art technology for reducing emissions, retiring older facilities that lacked environmental equipment and were not economically positioned for needed capital expenditures, and expanding the use of natural gas generation at a time when the natural gas market is providing historically low prices.

**IV. O&M AND OTHER ADJUSTMENTS**

**Q. PLEASE DESCRIBE THE O&M EXPENSES FOR THE FOSSIL/HYDRO/SOLAR FLEET.**

A. For the fossil units, approximately 79 percent of DE Carolinas' required O&M expenditures are fuel-related for the Test Period. The majority of non-fuel expenditures are for labor costs from Company or contract resources that

1 operate, maintain, and support the Fossil/Hydro/Solar facilities. Additionally,  
2 DE Carolinas has incurred incremental non-fuel O&M costs in order to  
3 operate and maintain the new generation resources described in this testimony.  
4 Finally, the Company continues to be challenged by costs driven by  
5 inflationary pressures for labor and materials.

6 **Q. HOW DOES THE COMPANY CONTROL AND MITIGATE O&M**  
7 **EXPENSE INCREASES? PLEASE PROVIDE EXAMPLES.**

8 A. The Company has many efforts in place for controlling and/or saving costs.  
9 For example, DE Carolinas optimizes outages based on run time, which has  
10 been affected by: (1) changes in the gas market; (2) milder than normal  
11 weather during 2016 - 2017; and, (3) new generation resources that further  
12 increased DE Carolinas' use of natural gas. This effort has provided savings  
13 with labor and material costs.

14 Duke Energy joined forces with other power companies to share best  
15 practices and learning opportunities with the Fossil Networking Group  
16 ("FNG"). The FNG includes Southern Company, Dominion Resources,  
17 American Electric Power and the Tennessee Valley Authority, who along with  
18 the Company, have seen tangible benefits in the area of safety and operations.

19 The Company runs its business in a disciplined manner and  
20 continuously balances cost management with safety and reliability to provide  
21 generation to our customers. Cost to customers is a key concern and the  
22 Company's diverse portfolio allows us to reduce overall fuel expense and take  
23 advantage of low natural gas prices.

**V. PERFORMANCE**

**Q. PLEASE DISCUSS THE OPERATIONAL RESULTS FOR DE CAROLINAS' FOSSIL/HYDRO/SOLAR FLEET DURING THE TEST PERIOD.**

A. The Company's Fossil/Hydro/Solar generating units operated efficiently and reliably during the Test Period. Several key measures are used to evaluate the operational performance depending on the generator type: (1) equivalent availability factor ("EAF"), which refers to the percent of a given time period a facility was available to operate at full power, if needed (EAF is not affected by the manner in which the unit is dispatched or by the system demands; it is impacted, however, by planned and unplanned maintenance (i.e., forced outage time); (2) equivalent forced outage rate ("EFOR"), which represents the percentage of unit failure (unplanned outage hours and equivalent unplanned derated hours); a low EFOR represents fewer unplanned outage and derated hours, which equates to a higher reliability measure; and (3) starting reliability ("SR"), which represents the percentage of successful starts.

The chart below provides operational results categorized by generator type, as well as results from the most recently published North American Electric Reliability Council ("NERC") Generating Unit Statistical Brochure ("NERC Brochure") representing the period 2013 through 2017. The NERC data reported for the coal-fired units represents an average of comparable units based on capacity rating. The data in the chart reflects DEC results compared to NERC five-year comparisons.

Generator Type	Measure	Review Period	2013-2017	Nbr of Units
		DEC Operational	NERC Average	
<i>Coal-Fired Test Period</i>	EAFF	78.5%	78.4%	752
	EFOR	4.8%	8.7%	
<i>2017 Summer</i>	Coal-Fired EAF	95.9%	n/a	n/a
	Combined Cycle EAF	94.7%	n/a	n/a
<i>Total CC Average</i>	EAFF	92.3%	85.0%	338
	EFOR	0.07%	5.3%	
<i>Total CT Average</i>	EAFF	84.7%	87.8%	776
	SR	99.4%	98.1%	
<i>Hydro</i>	EAFF	88.8%	80.4%	1,113

1     **Q.     HOW MUCH GENERATION DID EACH TYPE OF GENERATING**  
2     **FACILITY PROVIDE FOR THE TEST PERIOD?**

3     A.     For the Test Period, DE Carolinas' system total generation was approximately  
4     97.6 million megawatt-hours ("MWHs"). The Fossil/Hydro/Solar fleet  
5     provided approximately 37.3 million MWHs, or approximately 38 percent.  
6     The breakdown includes approximately 26 percent contribution from the coal-  
7     fired stations, 11 percent from gas facilities, and approximately 1 percent from  
8     renewable facilities, primarily hydro.

9     **Q.     IN YOUR OPINION, HAS DE CAROLINAS PRUDENTLY OPERATED**  
10    **ITS FOSSIL/HYDRO/SOLAR FLEET DURING THE TEST PERIOD?**

11   A.     Yes. The Company's performance data supports the conclusion that DE  
12   Carolinas has reasonably and prudently operated and maintained its  
13   Fossil/Hydro/Solar resources to maximize unit availability, minimize fuel  
14   costs and provide safe and reliable service to its customers.

1                   **VI. CAPITAL BUDGET AND COST DRIVERS**

2   **Q. WHAT IS THE ANTICIPATED CAPITAL BUDGET FOR**  
3   **FOSSIL/HYDRO/SOLAR OPERATIONS OVER THE NEXT THREE**  
4   **YEAR PERIOD?**

5   A. In order to continue to provide reliable service to customers, DE Carolinas  
6   plans to invest approximately \$1 billion in its Fossil/Hydro/Solar fleet during  
7   the period 2019 - 2021. Key efforts included in this projection are costs for  
8   the Bad Creek Pumped Storage runner upgrade project, dual fuel co-firing at  
9   Marshall and Belews Creek stations, future new generation facilities and other  
10   maintenance capital expenses.

11                   **VII. CONCLUSION**

12   **Q. IS THERE ANYTHING YOU WOULD LIKE TO SAY IN CLOSING?**

13   A. Yes. The Company has a proven history of experience-based, safe, quality,  
14   and cost competitive operations of a diverse generation portfolio. The  
15   Company has been active and diligent in its modernization efforts to ensure  
16   the right investments that continue, and build on, DE Carolinas' solid history  
17   of safely providing reliable, efficient, and cost effective generation while  
18   reducing environmental impacts and ensuring compliance with state and  
19   federal regulations. The diversity of the Company's generation assets provide  
20   significant benefit to customers in an economic dispatch environment,  
21   especially with the natural gas market continuing to experience low prices.  
22   DE Carolinas is positioned to continue as a leader in the industry with a solid  
23   base of knowledge and experience. This base rate increase will allow the

1           Company to continue the tradition of operational excellence and focus on safe  
2           operations and reliable generation.

3   **Q.    DOES THIS CONCLUDE YOUR PRE-FILED DIRECT TESTIMONY?**

4   A.    Yes.